

Abstract

A keep-warm system for a fuel cell power plant (10), typically of the proton exchange membrane (PEM) type. The keep-warm system prevents freeze-sensitive portions of the power plant, such as the cell stack assembly (CSA) (12) and the water management system (28, 30), from freezing under extreme cold external temperatures, during extended storage (CSA shut-down) periods of 7 days or more. The system uses pre-stored and pressurized fuel, typically hydrogen (25), normally used to fuel the anode (16) of the CSA, as fuel for a catalytic oxidation reaction at a catalytic burner (66). The hydrogen or other suitable fuel, is catalytically reacted with an oxidant, such as air (22), to produce heated gas that convectively passes in heat exchange relation with the freeze sensitive portions (12, 28, 30) of the power plant (10). The heat of the reacted hydrogen and air, typically 200⁰-700⁰ F, distributes that heated gas to the required portions of the power plant (10) and establishes the convective flow that induces the air flow to the burner (66). That convective flow obviates the need for parasitic electrical loads such as pumps and blowers. One or more thermal insulating means (64) substantially enclose the freeze-sensitive CSA (12) and/or the water management system (28, 30), as well as the convective flow of the heated gas from the catalytic burner (66), to improve system thermal efficiency.